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**E20 Rapid Cuff Inflator
Manual**

Serial No. 10281004

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E20 RAPID CUFF INFLATOR

Introduction

The E20 Rapid Cuff Inflator is ideal for inflating large or small blood pressure cuffs to a preset pressure. It will hold the output pressure constant indefinitely. Inflation and deflation are controlled by large bore solenoid valves so that the rate of air flow is usually only limited by the size of the connective tubing to the cuff. Internal circuitry prevents radio frequency interference during switching of the valves which could influence other sensitive laboratory instruments.

Plethysmography requires the rapid inflation and deflation of cuffs. The E20 is perfect for this application because of its rapid flow capability.

For blood pressure measurements the E20 allows the precise control of pressure by regulating the pressure down (or up) rather than bleeding it down. The user merely turns the regulator dial to change pressure. When the dial is stationary the pressure will hold at that level.

Specifications

Voltage Output:	Stereo phone jack connector on the rear panel of the E20. Signal = tip, Ground = ring and body. 1 millivolt / 1 mmHg pressure
Air Flow:	The E20 will inflate a large Hokanson thigh cuff to a preset pressure of 50 mmHg in less than 0.3 seconds and deflate it again in less than 0.2 seconds.
Dimensions:	36.2 cm (14.25") long, 22.9 cm (9") deep, 12.7 cm (5") high.
Weight:	4.8 kg (10.5 lbs.)
Power Requirements:	90 to 135 VAC, 60 Hz, 20 Watts. 240 VAC, 50 Hz Option available

SET UP

Clean Air Source	A clean source of air at 20 to 200 psi (1.4 to 14 atmospheres) is required for operation of the E20. A filter is recommended in line with the air hose to remove particles and liquid from the air, especially in humid climates. The Hokanson AG101 Air Source is the perfect companion to the E20 although piped-in air may be used where available. Bottled air may be used with a pre-regulator to lower the pressure to 200 psi. <u>DO NOT USE OXYGEN.</u> A small amount of air is consumed by the regulator in the E20 so an air tank will last longer if it is turned off between uses.
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Connecting the Air Source to the E20	The air supply should be connected to the right end of the E20. The E20 has a smooth brass input connector with a gray plastic ring and the input hose is black plastic. This hose should be pushed as far as possible into the input connector. In order to remove the hose, push hard on both sides of the gray ring and pull the hose out.
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Connect the other end of the input hose to your air source. If you are using a filter, it may be installed at either end of the air line. Observe the arrows on the filter showing the direction of flow. Note: when using the AG101 Air Source, it should be located on a smooth surface so that the air ventilation holes on its lower surface are not obstructed.

Connecting the Output Hose

The output air hose is a large ribbed hose. Screw the barbed plastic fitting into the hole on the left side of the E20 and slide the output hose connector over it. Secure the output hose onto the barbed fitting with a hose clamp.

There is a threaded hose at the rear of the E20 which exhausts the air from the cuff. Normally no connection should be made to this port.

OPERATING INSTRUCTIONS

Using cuffs adapted for Rapid Inflation and Deflation

Rapid inflation or deflation requires large bore connections to the cuff. The Y-connector on the end of the large corrugated output hose has two tapered holes which will accept the two 1/2" OD tubes of the large thigh cuffs. This connection provides the greatest air flow because there are no restrictions in the line. Connection is made by merely pushing the plastic tubes firmly into the metal ends of the "Y". Luer adapters are furnished with large cuffs which allow them to be inflated by hand; these should be removed when they are to be used with the E20.

Rapid inflation of 10 and 12 cm straight cuffs is possible if they have been modified to have a 1/2" OD connection tube without a luer fitting. SC10D and SC12D cuffs are equipped with 1/2" OD tubing for the rapid inflation required in plethysmography. In this case the 1/2" tube is plugged into one part of the "Y" connector while the other half is plugged.

Adapter Set

For use with small cuffs, where rapid inflation is not paramount, an adapter set is furnished which consists of a male Luer slip fitting on a length of plastic tubing and a plug of 1/2" tubing. Plug one port of the "Y" when using the small-cuff adapter.

A small amount of air is consumed by the regulator at all times. This is normal and will cause a slight hiss whenever pressure is applied to the instrument. The air line may be pressurized, even when the E20 is turned off without doing any harm.

Operation

When the E20 is first turned on, it will be in **PRESET** mode. At this time the pressure readout will indicate the setting of the regulator. It is the pressure which will be applied to the cuff when it is inflated. The cuff will be inflated by touching the front panel switch to put the instrument into **CUFF** mode. In **CUFF** mode the pressure of the cuff may be varied at will by turning the regulator control knob. The control knob may be locked by turning the thumb nut on the regulator shaft clockwise until it jams against the regulator. Complete, rapid deflation may be achieved by touching the switch again to put the instrument back into **PRESET** mode. Remote control of the E20 may be achieved by connecting a switch to the rear panel **FOOT SWITCH** jack.

APPLICATIONS

Plethysmography Arterial Inflow

In most plethysmographic applications, the regulator is set to 50 or 60 mmHg and the E20 is connected to a large thigh cuff for venous occlusion. Rapid inflation occurs when the instrument is switched into **CUFF** mode. A strain gauge plethysmograph applied to the limb is used to measure the initial increase in volume of the limb due to arterial inflow. This test may also be performed on arms and digits by using appropriate cuffs and strain gauges.

Maximum Venous Outflow

Maximum venous outflow (MVO) is measured by the same setup. After the venous occlusion cuff has been inflated for about two minutes the volume of the limb stops increasing. At this point the E20 is switched into **PRESET** mode to deflate the cuff quickly. The plethysmograph will record the decrease in volume of the limb which can be measured to determine.

Blood Pressure

Blood pressure measurements may be facilitated by using the E20 to control a pressure cuff. Ankle pressure, for example, can be measured by listening to flow in an artery distal to an ankle cuff with a Doppler or by sensing pulses in the toe with a plethysmograph prior to inflation of the ankle cuff. **PRESET** the E20 to a pressure above systolic and then switch to **CUFF** mode. Keep the Doppler probe in place (or balance the plethysmograph) and slowly decrease the pressure in the cuff by turning counterclockwise the **SET PRESSURE** knob until the flow signal is again detected. At this point read the systolic blood pressure from the digital readout.

OPTIONS

Three second Timer (3ST)

The three second timer is a battery powered timer with a cable which plugs into the Foot Switch jack on the rear of the E20,. When the E20 is in **PRESET** mode, pushing the button on the 3ST will switch the unit to **CUFF** mode for three seconds then switch it back to **PRESET** mode. This is useful for venous exams where it is desirable to inflate the cuff to augment venous flow while imaging the vein for a standard time and pressure.

Cycle Timer

The cycle timer is an option which may be built into the E20. It consists of two pre-settable timers which will inflate and deflate a cuff repeatedly as long as the timer is turned on. The Cycle Timer is particularly useful for arterial inflow measurements with a plethysmograph where it is desired to make repeated measurements at regular intervals. An example is where the left hand timer is preset to 5 seconds and the right hand timer is set to 10 seconds. If the E20 is in **PRESET** mode when the Cycle Timer is turned on, then the cuff will inflate for 5 seconds, deflate for 10 seconds, inflate for 5 seconds, etc. until the timer is turned off. With this setup the user could measure arterial inflow every 15 seconds.

SERVICE

Calibration

There are **no user serviceable parts** on the E20. Service should be referred to qualified personnel who have appropriate test equipment.

Calibration of the pressure readout may be accomplished from the outside case. The accuracy of the readout should be correct to ± 1 mmHg so a pressure standard is required which is more accurate than this in order to recalibrate the pressure readout.

Zero is the easiest point to calibrate. Set the pressure to zero by dialing the **SET PRESSURE** knob counter clockwise until no pressure shows. It would also be a good idea to put the E20 into **CUFF** mode with no cuff attached to be sure that there is no pressure applied to the electronic pressure transducer. Use a jeweler's screwdriver to adjust the **ZERO** potentiometer which is accessed through the center hole located on the bottom of the instrument near the front. Measure the output at the **ANALOG OUT** jack using an accurate voltmeter and adjust the potentiometer (R14) for a zero reading.

Full scale adjustment is made by applying a standard 300 mmHg pressure to the pressure transducer. This can be done in two ways. If an accurate standard gauge is used, the pressure output of the E20 should be connected to it and the instrument should be set us **CUFF** mode. Dial the regulator to obtain a reading of 300 mmHg on the standard gauge. Alternatively, if the standard is a pressure source, the top of the E20 should be removed and the pressure should be applied directly to the pressure transducer. This will be seen on the back of the printed circuit board with a black rubber tube attached to it. With a pressure of 300 mmHg applied to the transducer, adjust the right hand potentiometer (R32) for a voltage output of 300 millivolts at the **ANALOG OUTPUT** jack.

Finally, with the 300 mmHg pressure still applied, adjust the left hand adjustment potentiometer (R11) so that the readout matches the standard voltmeter.

GUARANTEE

All Hokanson electronic instruments are guaranteed against defects in parts, workmanship, and performance for a period of five years from the date of delivery provided that the instrument is not abused or repaired by an unauthorized person. Repair is free of charge when the instrument is returned prepaid. Return shipment will be made at our expense in a manner similar to your shipment to us. Transducers, blood pressure cuffs and accessories are guaranteed for one year. Batteries and headphones are excluded.

Please call the factory at 1(800)999-8251 or (425)882-1689 before sending any instrument for repair.



VENOUS REFLUX TESTING USING THE HOKANSON E20 / AG101 RAPID CUFF INFLATOR AND DUPLEX SCANNING

DESCRIPTION

Venous reflux, one of the major causes of chronic venous insufficiency, has been studied using duplex scanning and segmental examination of the venous system of the lower extremity. The reflux-provoking test maneuver can be standardized by the use of pneumatic cuffs, which are automatically inflated by the Hokanson E20 / AG101 Rapid Cuff Inflator. Incompetent valves will allow reflux when the cuff is rapidly deflated. An advantage of this maneuver is its applicability to all levels of the limb. Using a valsalva maneuver to cause reflux decreases in effectiveness with increasing distance from the abdomen. Manual compression distal to the valve under study is also possible in a standing patient, but varies with examiner, and it is usually necessary to use both hands to effectively empty a segment of the leg. Therefore a standardized compression using cuffs and controlled inflation/deflation is preferable.

PROCEDURE

Have the patient stand so that the study leg is relaxed. Their weight should be supported by the contralateral leg to prevent external compression of the popliteal vein. This can be achieved with the patient standing on a platform designed to allow the study leg to dangle, or with the patient standing with support from an orthopedic frame. Place a large cuff (Hokanson CC17™ or CC22™) around the thigh and connect it to the large hose of the E20 Rapid Cuff Inflator. For reliable compression of deep veins in a large thigh, make sure the width of the cuff is sufficient to prevent dissipation of pressure in the soft tissue. Typically, the width of the cuff should be equal to the diameter of the limb. Preset the pressure on the E20 Rapid Cuff Inflator to 80 mmHg. Using the duplex scanner transducer, locate the **common femoral vein** proximal to the cuff and position the sample volume. Using the E20, rapidly inflate the cuff for 3 seconds, then deflate it rapidly. (This maneuver can be simplified by using the Hokanson 3-Second Timer with the E20). Repeat this procedure with the sample volume positioned in the **superficial femoral vein** and the proximal part of the **greater saphenous vein (GSV)**. Then, remove the large thigh cuff and apply a 12 cm (Hokanson SC12D™) cuff below the knee to examine the **popliteal vein**. Preset the pressure on the E20 to 100 mmHg, and test the popliteal vein. The **lesser saphenous vein (LSV)** is tested the same way. On the medial side of the knee, locate and test GSV. Then move the cuff to the level of the ankle. Using the same preset pressure of 100 mmHg, test the **deep calf veins**. With a color flow Doppler with a 5 MHz transducer, visualize both the **posterior tibial veins** and **peroneal veins** from the medial aspect of the leg. Apply a 7 cm (Hokanson TMC7™) metatarsal cuff around the foot. Preset the E20 pressure to 120 mmHg. Locate and test the two posterior tibial veins.



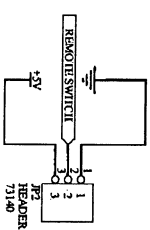
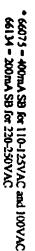
Duplex examination at the knee level. Testing the left popliteal vein.



QUANTIFICATION OF REFLUX²

**Mean velocity @ peak reflux (cm/sec) x cross-sectional area (cm²) =
Flow @ peak reflux (ml/sec)**

1. van Bemmelen PS, Bergan JJ: Quantitative Measurement of Venous Incompetence, R.G. Landes Company, Austin, TX 1992
2. Nicolaides AN, et al: Detection and Quantification of Venous Reflux with Duplex Scanning, in Vascular Diagnosis, 4th Edition, Eugene Bernstein, editor, pp. 902-914, Mosby – Year Book Inc., St. Louis, MO, 1993



Board No. 70610

ndoc	5/24/06
Revision	

SINGLE-LEVEL BILL OF MATERIALS REPORT

D.E. Hokanson, Inc.

WITH PHANTOM BLOW THROUGH

BILL	OPTN	TYPE	U/M	DESCRIPTION						
01927	BASE	STANDARD	EACH	s/a Chassis - E20 (12VDC Sol 10/05/2009						
LAST USED: 03/09/10 DRAWING: 87069.SLDDRW		YIELD%:	100.000%	MAX LOT SIZE: 0						
COMPONENT	TYP	QTY/BILL	U/M	SCRAP %	DESCRIPTION	ADD DATE	ECN	DEL DATE	ECN	FIND# STEP
04022		2.250	INCH	0.000%	BAR, FLAT, ALUMINUM, 1/4"x 1/					
04023		2.000	INCH	0.000%	ACETAL ROD, BLACK 1/2" x 8' 96					
04024		4.125	SQIN	0.000%	PLASTIC, ANTI GLARE, MED GRAY					
04034		0.250	INCH	0.000%	ROD, ALUMINUM, 1 Dia." (Alloy					
04040		2.500	INCH	0.000%	bulk TUBING (PVC) REINFORCED 1					
04895		7.500	INCH	0.000%	TUBE PVC 3/32 x 5/32" CLEAR (T					
04907		1.000	INCH	0.000%	TUBE PVC 5/8x1/2x1/16" Clear					
56037		2.000	EACH	0.000%	SHOULDER WASHER NYLON (HEAT SI					
62122		1.000	EACH	0.000%	BEZEL SWITCH BLACK (for E20-12					
62126		1.000	EACH	0.000%	CAP, SWITCH, GREEN					
63025		1.000	EACH	0.000%	TRANSFORMER Main Power, E20, C					
62470		1.000	EACH	0.000%	SWITCH CAP BLACK (for E-20-12					
66075		0.000	EACH	0.000%	FUSE 5x20mm Slow 200mA					
67442		1.000	EACH	0.000%	POWER MODULE, 2-FUSE, 5x20mm,					
66134		0.000	EACH	0.000%	FUSE 5x20mm Slow 4/10Amp (ROH					
72009		2.000	EACH	0.000%	CON/JACK STER PHONE NON-INSUL					
73666		2.000	EACH	0.000%	CON/TERMINAL CRIMP (F) 1/4" FU					
75161		1.000	EACH	0.000%	Chassis LID - E20					
75173		1.000	EACH	0.000%	Chassis VALVE-SUPPORT BRACKET					
75164		1.000	EACH	0.000%	Chassis REGULATOR PLATE - E20					
75172		1.000	EACH	0.000%	CHASSIS BASE - E20					
77599		4.000	EACH	0.000%	FEET, BLACK PLASTIC BUMPON psa					
77666		3.000	EACH	0.000%	LUG, SOLDERABLE, #6					
77874		2.000	EACH	0.000%	SOLENOID VALVE - 12VDC (ASCO)					
77882		1.000	EACH	0.000%	REGULATOR, PRESSURE, 3/8" INPUT					
78007		1.000	EACH	0.000%	ADAPTER HOSE 1/4"MNPT x 1/8" H					
78011		1.000	EACH	0.000%	ADAPTER HOSE 3/8NPT x 1/2 HOSE					
78016		1.000	EACH	0.000%	ADAPTER HOSE 1/2NPT-1/2 NYLON					
78221		1.000	EACH	0.000%	PIPE COUPLING Female 1/2x1/2 N					
78230		2.000	EACH	0.000%	PIPE NIPPLE 1/2NPT CLOSE GALV					
78240		1.000	EACH	0.000%	PIPE NIPPLE 1/2NPT x2" GALV					
78250		1.000	EACH	0.000%	PIPE TEE 1/2 NPT GALV					
78255		1.000	EACH	0.000%	PLUG PIPE BRASS 1/4" NPT					
78301		1.000	EACH	0.000%	BUSHING HEX 1/2-3/8 NPT BRASS					
78659		1.000	EACH	0.000%	CONNECTOR, MALE SPEED-TUBE/NPT					
79220		2.000	EACH	0.000%	SCREW, MACH 1/4-20 x 1/2 FH.T					

SINGLE-LEVEL BILL OF MATERIALS REPORT

WITH PHANTOM BLOW THROUGH

BILL	OPTN	TYPE	U/M	DESCRIPTION						
01927	BASE	STANDARD	EACH	s/a Chassis - E20 (12VDC Sol 10/05/2009						
COMPONENT	TYP	QTY/BILL	U/M	SCRAP %	DESCRIPTION	ADD DATE	ECN	DEL DATE	ECN	FIND# STEP
79317		8.000	EACH	0.000%	SCREW, MACH 4-40x1/4 FH PHIL					
79400		4.000	EACH	0.000%	SCREW, MACH 6-32x1/4 PH PHIL					
79345		2.000	EACH	0.000%	SCREW, MACH SOCKET HEAD 4-40 x					
79448		1.000	EACH	0.000%	SCREW, MACH,8-32 x 1-3/4 PAN,P					
79743		8.000	EACH	0.000%	NUT KEPS 6-32 C/S					
79744		2.000	EACH	0.000%	NUT KEPS HEX 8-32 C/S					
79785		2.000	EACH	0.000%	WASHER, Fender, #6 x 5/8" OD,					
79886		2.000	EACH	0.000%	WASHER 3/4id x 1.5od x 9/64" S					
79925		1.000	EACH	0.000%	WASHER 3/4 x 1.5OD NEOPRENE (					
82455		1.000	EACH	0.000%	labr PAINT E20 END PLATE					

SINGLE-LEVEL BILL OF MATERIALS REPORT

WITH PHANTOM BLOW THROUGH

BILL	OPTN	TYPE	U/M	DESCRIPTION						
01925	BASE	STANDARD	EACH	s/a MAIN BD - E20 (12VDC Vers						
LAST USED: 04/11/08		YIELD%:	100.000%	MAX LOT SIZE:	0					
DRAWING: 0000		ROUTING:	0000							
COMPONENT	TYP	QTY/BILL	U/M	SCRAP %	DESCRIPTION	ADD DATE	ECN	DEL DATE	ECN	FIND# STEP
11054		1.000	EACH	0.000%	RES 121 OHM 1% 1/4W M-FILM AXI					R2
11054		1.000	EACH	0.000%	RES 121 OHM 1% 1/4W M-FILM AXI					R4
11514		1.000	EACH	0.000%	RES 365 OHM 1% 1/4W M-FILM AXI					R3
11914		1.000	EACH	0.000%	RES 953 OHM 1% 1/4W M-FILM AXI					R1
12304		1.000	EACH	0.000%	RES 2.32K OHM 1% 1/4W M-FILM A					R17
12304		1.000	EACH	0.000%	RES 2.32K OHM 1% 1/4W M-FILM A					R19
12304		1.000	EACH	0.000%	RES 2.32K OHM 1% 1/4W M-FILM A					R23
12304		1.000	EACH	0.000%	RES 2.32K OHM 1% 1/4W M-FILM A					R24
12324		1.000	EACH	0.000%	RES 2.43K OHM 1% 1/4W M-FILM A					R16
12324		1.000	EACH	0.000%	RES 2.43K OHM 1% 1/4W M-FILM A					R18
12914		1.000	EACH	0.000%	RES 10.0K OHM 1% 1/4W M-FILM A					R22
13204		1.000	EACH	0.000%	RES 20.0K OHM 1% 1/4W M-FILM A					R12
13874		1.000	EACH	0.000%	RES 100K OHM 1% 1/4W M-FILM AX					R14
13984		1.000	EACH	0.000%	RES 130K OHM 1% 1/4W M-FILM AX					R15
20694		1.000	EACH	0.000%	RES 1.0K OHM 5% 1/4W C-FILM AX					R9
20694		1.000	EACH	0.000%	RES 1.0K OHM 5% 1/4W C-FILM AX					R11
21264		1.000	EACH	0.000%	RES 220K OHM 5% 1/4W C-FILM AX					R6
21324		1.000	EACH	0.000%	RES 390K OHM 5% 1/4W C-FILM AX					R5
21324		1.000	EACH	0.000%	RES 390K OHM 5% 1/4W C-FILM AX					R7
21344		1.000	EACH	0.000%	RES 470K OHM 5% 1/4W C-FILM AX					R10
21424		1.000	EACH	0.000%	RES 1.0M OHM 5% 1/4W C-FILM AX					R8
29025		1.000	EACH	0.000%	TRIMPOT 200 OHM 3/4" long 15-T					R20
29150		1.000	EACH	0.000%	TRIMPOT 10K OHM 10% 3/4W M-TUR					R13
29150		1.000	EACH	0.000%	TRIMPOT 10K OHM 10% 3/4W M-TUR					R21
31101		1.000	EACH	0.000%	CAP CER 100pF 10% 50V .1" RADI					C15
33101		1.000	EACH	0.000%	CAP CER .01uF 10% 50V .1" L.S					C6
33101		1.000	EACH	0.000%	CAP CER .01uF 10% 50V .1" L.S					C13
33395		1.000	EACH	0.000%	CAP FILM .039uF 5% 100V, Radia					C3
33395		1.000	EACH	0.000%	CAP FILM .039uF 5% 100V, Radia					C4
33395		1.000	EACH	0.000%	CAP FILM .039uF 5% 100V, Radia					C8
33395		1.000	EACH	0.000%	CAP FILM .039uF 5% 100V, Radia					C10
34101		1.000	EACH	0.000%	CAP CER .1uF 10% 50V .1" (104)					C16
34117		1.000	EACH	0.000%	CAP FILM .1uF 10% 100V RADI					C14
34227		1.000	EACH	0.000%	CAP FOIL .22uF 5% 100V RADIAL					C11

SINGLE-LEVEL BILL OF MATERIALS REPORT

WITH PHANTOM BLOW THROUGH

BILL	OPTN	TYPE	U/M	DESCRIPTION	ADD DATE	ECN	DEL DATE	ECN	FIND#	STEP
01925	BASE	STANDARD	EACH	s/a MAIN BD - E20 (12VDC Vers						
COMPONENT	TYP	QTY/BILL	U/M	DESCRIPTION	ADD DATE	ECN	DEL DATE	ECN	FIND#	STEP
34471		1.000	EACH	0.000% CAP CER .47uF 20% 50V RADIAL						
36104		1.000	EACH	0.000% CAP TANTALUM 10uF 10% 16V .1"						C12
36104		1.000	EACH	0.000% CAP TANTALUM 10uF 10% 16V .1"						C7
37106		1.000	EACH	0.000% CAP A-LYTIC 100uF 25V 20% RADI						C9
37106		1.000	EACH	0.000% CAP A-LYTIC 100uF 25V 20% RADI						C1
38479		1.000	EACH	0.000% CAP A-LYTIC 4700uF 20% 35V RAD						C5
40090		1.000	EACH	0.000% I.C. FLIP-FLOP DUAL D 14-DIP (						C2
45390		1.000	EACH	0.000% I.C. VOLT-CONVERT CMOS 8-DIP (						IC3
45620		1.000	EACH	0.000% I.C. ADC 3.5-DIGIT DISP CMOS 4						IC6
45655		1.000	EACH	0.000% I.C. TIMER CMOS 8-DIP (REPLAC						IC7
45785		1.000	EACH	0.000% I.C. INSTRUMENTATION AMP AD623						IC5
45787		1.000	EACH	0.000% OP AMP AD822ANZ LEAD-FREE						IC13
50310		1.000	EACH	0.000% DIODE RECTIFIER 100V DO-41						IC12
50310		1.000	EACH	0.000% DIODE RECTIFIER 100V DO-41						D3
54155		1.000	EACH	0.000% LED 7-SEG RHDP HI-RED .6h 10-d						D4
54155		1.000	EACH	0.000% LED 7-SEG RHDP HI-RED .6h 10-d						IC8
54155		1.000	EACH	0.000% LED 7-SEG RHDP HI-RED .6h 10-d						IC9
54330		1.000	EACH	0.000% LED HI-EFF RED TINTED DIFFUSED						IC10
54330		1.000	EACH	0.000% LED HI-EFF RED TINTED DIFFUSED						D1
55014		1.000	EACH	0.000% TRANS VOLT-REF DIODE 1.235V 2%						D2
55014		1.000	EACH	0.000% TRANS VOLT-REF DIODE 1.235V 2%						IC11
55027		1.000	EACH	0.000% TRANS 'HEXFET' Power MOSFET N-						IC14
55027		1.000	EACH	0.000% TRANS 'HEXFET' Power MOSFET N-						Q1
55028		1.000	EACH	0.000% RECTIFIER BRIDGE 1.9A Single P						Q2
55029		1.000	EACH	0.000% REGULATOR 1.5A Low Dropout Pos						IC1
55029		1.000	EACH	0.000% REGULATOR 1.5A Low Dropout Pos						IC2
58112		1.000	EACH	0.000% TRANSDUCER, E20 PRESSURE SENSO						IC4
62132		1.000	EACH	0.000% SWITCH, Voltage Selector (Arco						X1
62158		1.000	EACH	0.000% SWITCH Power, Push-Button (w/M						S1
62274		1.000	EACH	0.000% SWITCH BODY-ONLY, MOMENTARY w/						S3
70610		1.000	EACH	0.000% E20 MAIN BOARD (05/02/06)						S2
72000		1.000	EACH	0.000% SOCKET IC STANDARD DIP 8 (DUAL						PCB
72061		1.000	EACH	0.000% SOCKET IC STANDARD DIP 32 (DU						IC6
73634		1.000	EACH	0.000% CON/RECEPTACLE, 16-PIN, DUAL R						LED'S
73140		0.080	STRP	0.000% CON/HEADER 36 Straight (bulk)						JP1
										JP2

SINGLE-LEVEL BILL OF MATERIALS REPORT

WITH PHANTOM BLOW THROUGH

BILL	OPTN	TYPE	U/M	DESCRIPTION						
01925	BASE	STANDARD	EACH	s/a MAIN BD - E20 (12VDC Vers						
COMPONENT	TYP	QTY/BILL	U/M	SCRAP %	DESCRIPTION	ADD DATE	ECN	DEL DATE	ECN	FIND# STEP
73636		1.000	EACH	0.000%	CON/HEADER, 16-Pin, Dual Row w					JP1
73648		16.000	EACH	0.000%	CON/PINS, Female minifit termi					JP1
79515		2.000	EACH	0.000%	SPACER, ROUND, NYLON, #6 X 3/1					SPACR
72000		1.000	EACH	0.000%	SOCKET IC STANDARD DIP 8 (DUAL					IC13
72000		1.000	EACH	0.000%	SOCKET IC STANDARD DIP 8 (DUAL					IC5
72000		1.000	EACH	0.000%	SOCKET IC STANDARD DIP 8 (DUAL					IC12
72010		1.000	EACH	0.000%	SOCKET IC STANDARD DIP 14 (DU					IC3

3. Replace valve bonnet and bonnet screw on valve body. Hand thread screws a few turns into valve body, then torque bonnet screws in a crisscross manner to 70 ± 8 in-lbs [$8,0 \pm 0,9$ Nm].
4. Install solenoid base gasket and solenoid base sub-assembly. Compress rider ring slightly to prevent damage when installing solenoid base sub-assembly. Torque solenoid base sub-assembly to 175 ± 25 in-lbs [$19,8 \pm 2,8$ Nm].
5. Install solenoid, see separate instructions and make electrical hookup.

▲ WARNING: To prevent the possibility of death, serious injury or property damage, check valve for proper operation before returning to service. Also perform internal seat and external leakage tests with a nonhazardous, noncombustible fluid.

6. Restore line pressure and electrical power supply to valve.
7. After maintenance is completed, operate the valve a few times to be sure of proper operation. A metallic "click" signifies the solenoid is operating.

ORDERING INFORMATION FOR ASCO REBUILD KITS

Parts marked with an asterisk(*) in the exploded view are supplied in Rebuild Kits.

- When Ordering Rebuild Kits for ASCO Valves, order the Rebuild Kit number stamped on the valve nameplate. +

+ If the number of the kit is not visible, order by indicating the number of kits required, and the Catalog Number and Serial Number of the valve(s) for which they are intended.

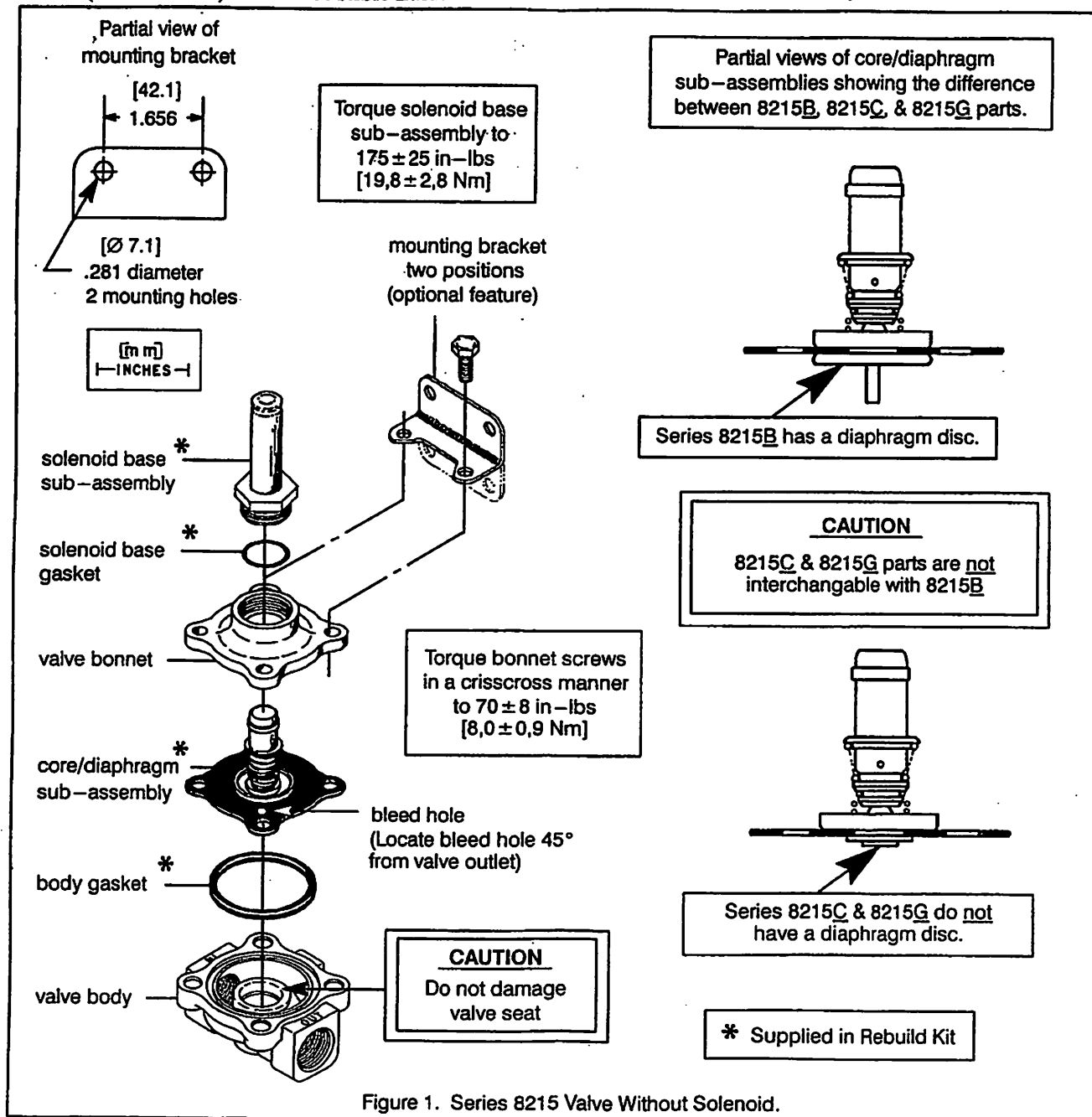


Figure 1. Series 8215 Valve Without Solenoid.

Installation & Maintenance Instructions

2-WAY INTERNAL PILOT-OPERATED SOLENOID VALVES
NORMALLY CLOSED OPERATION – 3/8", 1/2", OR 3/4" NPT

SERIES

8215

Form No.V5495R4

IMPORTANT: See separate solenoid installation and maintenance instructions for information on: Wiring, Solenoid Temperature, Causes of Improper Operation, Coil, or Solenoid Replacement.

DESCRIPTION

Series 8215 valves are 2-way normally closed internal pilot-operated solenoid valves. Valve bodies are made of rugged aluminum with trim and internal parts made of steel and stainless steel. Series 8215 valves may be provided with a general purpose, explosionproof, or watertight/explosionproof solenoid enclosure.

OPERATION

Normally Closed: Valve is closed when solenoid is de-energized; open when energized.

NOTE: No minimum operating pressure differential required.

INSTALLATION

CAUTION: Not all valves are approved for fuel gas service. Check nameplate for correct catalog number, pressure, voltage, frequency, and service. Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel.

Future Service Considerations

Provision should be made for performing seat leakage, external leakage, and operational tests on the valve with a nonhazardous, noncombustible fluid after disassembly and reassembly.

Temperature Limitations

For maximum valve ambient and fluid temperatures, refer to chart below. Check catalog number prefix on nameplate to determine maximum temperatures.

Construction AC or DC	Coil Insulation Class	Catalog Number Prefix	Max. Ambient Temp °F	Max. Fluid Temp °F
AC	F	None	125	125
	H	H	140	140
DC 11.2 watts	F or H	None or HT	77	77
DC 11.6 watts	F or H	None or HB	104	104

Positioning

AC Construction: Valve is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertical and upright so as to reduce the possibility of foreign matter accumulating in the solenoid base sub-assembly area.

DC Construction: Valve must be mounted with solenoid vertical and upright.

Mounting

For mounting bracket (optional feature) dimensions, refer to Figure 1.

Piping

Connect piping to valve according to markings on valve body. Apply pipe compound sparingly to male pipe threads only. If applied to valve threads the compound may enter the valve and cause operational difficulty. Avoid pipe strain by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point.

CAUTION: To avoid damage to the valve body, DO NOT OVERTIGHTEN PIPE CONNECTIONS. If Teflon* tape, paste, spray, or similar lubricant is used, use extra care when tightening due to reduced friction.

IMPORTANT: To protect the solenoid valve, install a strainer or filter, suitable for the service involved, in the inlet side as close to the valve as possible. Clean periodically depending on service conditions. See ASCO Series 8600, 8601, and 8602 for strainers.

MAINTENANCE

▲ WARNING: To prevent the possibility of death, serious injury or property damage, turn off electrical power, depressurize valve, extinguish all open flames and avoid any type of sparking or ignition. Vent hazardous or combustible fluid to a safe area before servicing the valve.

NOTE: It is not necessary to remove the valve from the pipeline for repairs.

Service Notice

CAUTION: Series 8215C and 8215Q valve parts are not interchangeable with Series 8215E valves. Series 8215E valves have a different valve body and a core/diaphragm sub-assembly with a diaphragm disc. Interchanging parts will cause valve malfunction. See Figure 1 for identification of parts.

Cleaning

All solenoid valves should be cleaned periodically. The time between cleanings will vary depending on the medium and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. In the extreme case, faulty valve operation will occur and the valve may fail to open or close. Clean valve strainer or filter when cleaning the valve.

Preventive Maintenance

1. Keep the medium flowing through the valve as free from dirt and foreign material as possible.
2. While in service, the valve should be operated at least once a month to insure proper opening and closing.
3. Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Causes of Improper Operation

1. **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
2. **Excessive Leakage:** Disassemble valve and clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Valve Disassembly

1. Remove solenoid, see separate instructions.
2. Unscrew solenoid base sub-assembly and body gasket.
3. Remove bonnet screws, valve bonnet, solenoid base gasket, core/diaphragm sub-assembly and body gasket.
4. All parts are now accessible to clean or replace. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Valve Reassembly

1. Lubricate solenoid base gasket and body gasket with DOW CORNING® 200 Fluid lubricant or an equivalent high-grade silicone fluid.
2. Install body gasket and core/diaphragm sub-assembly in valve body. Locate the bleed hole in the diaphragm assembly approximately 45° from valve outlet. The core/diaphragm sub-assembly is comprised of a rider ring, core spring, core guide, hanger spring, core assembly, and diaphragm assembly.

CAUTION: Do not distort hanger spring between core assembly and diaphragm assembly.

*DuPont Co. Registered Trademark

• ASCO •

MM

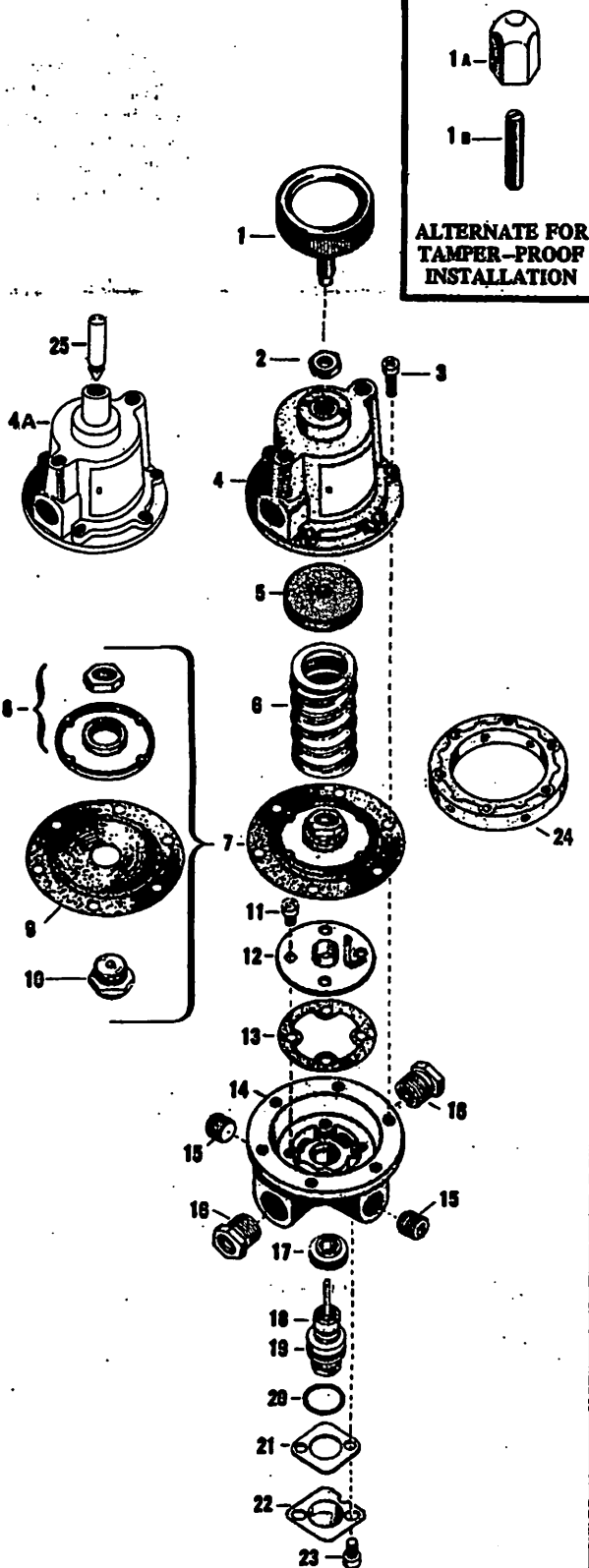
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Page 1 of 2

50 Hanover Road, Florham Park, New Jersey 07932 www.ascovalve.com

MODEL 10 AIR REGULATOR



Index No.	Part No.	Nomenclature	Quantity
1	4124-1	Knob assembly (Supplied with nameplate attached)	1
1A	614	Cap nut	1
1B	8159-16	Adjusting screw	1
2	1120	Jam nut	1
3	Comm.	10-32 x 3/4" lg. fil. hd hold-down screw	6
4	1822	Bonnet subassembly-Specify catalog no.	1
5	6058	Spring seat	1
6	6060	Range spring-Specify catalog no.	1
7	6091*	Diaphragm assembly	1
8	6054	Diaphragm piston and nut	1
9	7031	Control diaphragm	1
10	6088*	Relief seat assembly	1
11	Comm.	10-32 x 5/16" lg. fil. hd screw	4
12	1948	Seal plate and jet tube assembly-Specify catalog no.	1
13	6053	Seal plate gasket	1
14	6050	Body-Specify catalog no.	1
15	1174	Gage tap plug	2
16	6047	Reducing bushing 3/8" x 1/4" (optional)	2
17	6070	Seat ring	1
18	6017	Screen	1
19	1820	Inner valve assembly	1
20	7156	"O" ring	1
21	6027	Retaining plate	1
22	7136	Retaining cap	1
23	Comm.	10-32 x 5/16" lg. fil. hd screw	2

When ordering spare parts specify part number and catalog no.

*These parts change for "N" type, non-relieving units.
To order specify.

Pt. 6091N Diaphragm Assembly
Pt. 6088N Relief Seat Assembly

Recommended Spares Kit, includes
Index no's. 7, 13, 17, 19 & 20

NOTE: Mounting bracket for this unit is available. Order part no. 9921.

300 PSIG & 400 PSIG RANGE

3	Comm.	10-32 x 1 1/8" lg. fil. hd. hold-down screw	6
7	10272	Diaphragm Assembly	1
8	10168	Nut	1
8A	10166	Piston	1
9	7032	Diaphragm	1
10	6088	Relief Seat Assembly	1
24	10167	Spacer	1

MODEL 10R

4A	9493	Bonnet subassembly-Specify catalog no.	1
25	9492	Plunger	1

MODEL 10C

14	9890	Body-Subassembly-Specify catalog no.	1
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ELECTRICAL LEAKAGE AND HIPOT TEST

INSTRUMENT: E-20

SERIAL NUMBER: 10281004

LEAKAGE TEST:

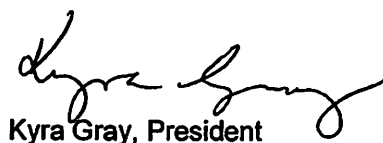
MODE	GROUND	POWER ON		POWER OFF		CURRENT LIMIT (uA)
		normal	reverse	normal	reverse	
EXPOSED CHASSIS METAL TO GROUND	OPEN	15.38	13.47	10.80	10.47	100 uA AC
	INTACT	0.04	0.03	0.05	0.05	10 uA AC
DOPPLER CONN. RING TO GROUND	OPEN					0.0 uA DC
	INTACT					100 uA DC

☒ PASSED HIPOT TEST: 60 SECONDS AT 1500 VAC

☒ PASSED GROUND IMPEDANCE TEST: $< .1 \Omega$ AT 25 AMPS FOR 10 SECONDS

Hokanson®**EC Declaration of Conformity****E20 Rapid Cuff Inflator**

Manufacturer 	D. E. Hokanson, Inc. 12840 NE 21 st Place Bellevue, WA 98005, USA Tel 425 882 1689 Fax 425 881 1636
Authorized Representative in EC  	Hokanson UK Waldeck House, Waldeck Road Maidenhead, Berkshire SL6 8BR England Tel 44 01628 773233 Fax 44 01628 770562
Details of Electrical Equipment	Line powered, Class 1 Type B Equipment 230 VAC, 50 Hz, 35 Watts
Classification of Device (Annex IX)	I
Model Description	E20 Rapid Cuff Inflator
Directives this equipment complies with	Council Directive 93/42/EEC Concerning Medical Devices.
Harmonized Standards applied in order to verify compliance with Medical Device Directives	IEC 60601-1 General Requirements for Basic Safety & Essential Performance IEC 60601-1-2 Electromagnetic compatibility IEC 60601-1-6 Usability
Technical Construction File maintained at:	D. E. Hokanson, Inc. 12840 NE 21 st Place Bellevue, WA 98005, USA
Date of Issue	June 15, 2010
Notified Body:	DQS Medizinprodukte GmbH D-60433 Frankfurt am Main August-Schanz-Strasse-21 Germany 0297


Kyra Gray, President

Bellevue, WA 98005, USA